

REMARKS

The present application includes claims 187-209, 212-213, 215, 218-221, 223, 227, 231-232 and 237-258. Claims 210, 211, 214, 216, 217, 222, 224-226, 228-230 and 233-236 are currently being cancelled. Claims 187-188 and 240 were amended for reasons discussed below. Claims 194-196, 199, 201-204, 206-209, 212-213, 215, 218-221, 223, 227, 231 and 237-238 were amended to change their dependencies and in some of the claims to match the wording of the parent claim.

Support of new claims

Claims 247-258 are new. Claims 252-253 find support at least in original claim 1. Claim 247 finds support at least in original claim 88. New claims 248-251 and 254-258 find support at least on page 36:

“In a preferred embodiment of the present invention, AGC is performed by an attenuator 132 with a feedback circuit 134 similar to feedback circuit 122 described above. Preferably, an attenuator 140 is placed on the fiber receiving a beam for transmission from an LTE, in order to prevent amplifier 130 from saturating. Preferably, amplifier 130 has a substantially constant amplification which is suitable to serve both as a booster and a pre-amplifier.

In a preferred embodiment of the invention, attenuator 132 comprises a fiber-coupled acousto-optical modulator such as PN:AMM-55-3.2-170-1550-2FP, available from Brimrose, located in Baltimore, Maryland, US. Alternatively, attenuator 132 comprises an electro absorption attenuator or any other suitable attenuator with an adjustable attenuation level which changes at a rate sufficient for AGC. Attenuator 140 preferably comprises a simple variable attenuator as it does not require a high rate adjustable attenuation level.”

Response to Examiner rejections

In order to focus the discussion, independent claims 210, 217, 224 and 233 were cancelled, so that only independent method claim 187, the corresponding independent apparatus claim 240 and new independent claims 253 and 254, which stem from old claim 187, remain in the application. Applicants reserve the option of filing divisionals for the subject matter of these claims.

Rejections claims 187-239

Claims 187-189, 197, 201, 204 and 220 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109).

Claim 190 stands rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Britz et al. (US patent 6,122,084).

Claims 191-194, 215, 221 and 233 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (US patent 6,057,951).

Claims 195-196, 207-208 and 218 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Okamura.

Claims 202-203 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Dodley (US patent 5,966,229).

Claims 187-189, 197, 199-201 and 205-206 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Britz et al. (US patent 6,122,084).

Claims 195-196, 198 and 207-208 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Britz et al. (US patent 6,122,084) and further in view of Okamura.

Claim 209 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888) in view of Britz et al. (US patent 6,122,084) and further in view of Masuda et al.

Claim 212 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Heidemann (US patent 5,335,109).

Claims 213 and 215 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (US patent 6,057,951).

Claims 218, 219 and 227 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Okamura.

Claims 231 and 232 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888).

Claim 223 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Okamura and Masuda et al.

Claim 237 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888) and Okamura and further in view of Terahara (US patent 6,134,034).

Claims 238 and 239 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888) and Okamura and further in view of Terahara (US patent 6,134,034) and Jackal (US patent 6,175,436).

Independent claim 187

Claim 187 was amended to require retransmitting the received beam with the changed amplitude, without converting the beam into electrical signals and regenerating the beam. In addition, claim 187 was amended for form, without direct relation to the office action.

The use of attenuations in changing the amplitude of a received beam is described in the art by Heidemann and Britz. Both Heidemann and Britz, however, suggest the use of attenuations before a detector, which converts the light beam into electrical signals (In Heidemann, photodiode 1 and in Britz receiver 65), contrary to the requirements of amended claim 187. The reason for the attenuations is specifically stated by Britz (col. 1, lines 37-38 and col. 2, lines 7-10) as ensuring a safe operating range for a detector. Applicants respectfully note that the reasons presented by Heidemann (large bandwidth, great dynamic range, high sensitivity and immunity to overloading) cited by the Examiner, are brought in relation to the basic idea of controlling the gain by an optical amplifier, presented by Heidemann (col. 1, lines 41-42) and not in relation to the use of attenuations.

Thus, the only suggestion in the art of record for using attenuations is for an optical amplitude modifier located before a detector, in order to protect the detector, and not for apparatus which retransmits the beam (without electrical conversion) after changing the amplitude, as required by amended claim 187. In fact, in view of the requirement that the beam was received from free space (and therefore did not have too high an amplitude for transmission through free space) and the known fact that in normal conditions the amplitude of a beam does not increase in its propagation, the art of record does not provide any reasoning to use attenuations under the other requirements of claim 187.

The dependent claims are allowable at least by virtue of their parent claim. Nonetheless, at least some of the independent claims add further patentability over the art. Claim 188, for example, as amended, requires changing the amplitude by a factor determined responsive to an extent to which the received beam was affected by the atmosphere, so as to substantially cancel the affect of the atmosphere. This is not taught or suggested by Heidemann which relates to fiber

communications or by Britz, which controls the level of amplitude change in steps of 6 dB (col. 2, line 30 and col. 4, lines 44-46).

New independent claim 253

New independent claim 253 is similar to old claim 187 amended in form, but requires that the received beam is directed into a single mode fiber.

In the art of record, beams received from the atmosphere are directed into multi-mode fibers, which have larger diameters than single mode fibers and therefore allow simpler aiming and better light collection. US patent 4,960,315 to Kostal et al., cited in the background of the present application, suggests transmitting a light beam from a single mode fiber and receiving the beam by a multi-mode fiber. PCT publication WO 00/16489 to Jolt states that use of a single mode fiber is not good and suggests using multi-mode fibers for both transmission and reception (page 9, line 30 - page 10, line 7).

With reference to claim 206, the Examiner referred to the single mode fiber of the ERDA of Willebrand (col. 10, lines 41-44). Applicants respectfully note, however, that Willebrand does not mention directing the received beam into a single mode fiber but only passing it through a single mode ERDA. Therefore, the Examiner has not established a *prima facie* case of obviousness against claim 253 and old claim 206, as the art does not teach the element of directing the received beam into a single mode fiber.

But even if Willebrand directs the received beam into a single mode fiber, it would not be obvious to combine the teachings of Willebrand with those of Heidemann or Britz, since Willebrand relates to "all-optical terrestrial optical communication" (col. 1, lines 9-11), while Heidemann and Britz use attenuators to protect detectors which perform electrical conversion of the received beam.

As is known in the art, single mode fibers are preferred for long range use while multi-mode fibers are preferred for short range use (e.g., leading a beam to a detector). Since the only teaching in the art to perform optical attenuations is before a detector, where multi-mode fibers are used, it would not be obvious to combine the directing of a received beam into a single mode fiber and changing the amplitude using attenuations, as required by claim 253.

New independent claim 254

New independent claim 254 is similar to old claim 187 amended for form, but requires passing the received beam directed into the at least one fiber, through an optical amplifier and an optical attenuator arranged in series. This is not taught or suggested by any of the cited art.

With regard to claim 199, the Examiner stated that combining Willebrand and Britz would result in an amplifier of constant gain (from Willebrand) and a variable attenuator (from Britz). Applicants respectfully traverse this rejection and state that the Examiner has not established a *prima facie* case of obviousness, since the combining of Willebrand and Britz would not result in arranging an optical amplifier and an optical attenuator in series (which is not taught in the art), but rather would most likely result in an amplitude modifier such as the EDF 3, of Heidemann, which performs both amplification and attenuation. There is no reason to assume using two elements, if one element can suffice.

Willebrand suggests using an ERDA 36 (Fig. 2) to amplify the strength of the received optical signal (col. 8, line 1). Adaptive power control is used to bring the optical power of the signal to an optimal level (col. 11, lines 30-63) to overcome atmospheric conditions. Britz suggests using an attenuator to adjust the power control of the received signal in order to protect a detector (col. 2, lines 23-26). As Willebrand suggests adaptive power control, it is not clear what Britz adds to Willebrand and why combine the references. But even if it is desired to modify Willebrand to use a detector and hence attenuations are required as in Britz, there is no reason to use both an amplifier and an attenuator which counteract each other.

Independent claim 240

Claim 240 stands rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109).

Claim 246 stands rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (US patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Okamura.

Claims 240-242 and 244 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888), in view of Britz et al. (US patent 6,122,084).

Claim 245 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888) and Britz (US patent 6,122,084) and further in view of Masuda et al.

Claim 243 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (US patent 6,239,888) and Britz (US patent 6,122,084) and further in view of Terahara (US patent 6,134,034).

Claim 240 was amended to require a transmitter adapted to transmit beams from the optical amplitude modifier, without regeneration of the beams. As discussed regarding claim 187 this is not obvious in view of the art of record.

The dependent claims are allowable at least because of their parent claim.

Conclusion

In view of the above remarks, applicants respectfully submit that the claims are patentable over the prior art. Allowance of the application is respectfully awaited. If, however, the Examiner is not convinced and the Examiner is of the opinion that a telephone conversation may forward the present application toward allowance, applicants respectfully request that the Examiner call the undersigned at 1 (877) 428-5468. Please note that this is a direct *toll free* number in the US that is answered in the undersigned's Israel office. Israel is 7 hours ahead of Washington.

Respectfully submitted,
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